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Learning diary for the tenth week.  

Development of our Project. What you have learnt and what you have not?  

In the previous week we did some steps in implementing our “Zoo” Expert Systems project. We have also encountered some difficulties in calculating the probabilities for the class (group) classifier. The problem was that when we were determining our probabilities, most of them were greater then zero. In this situation we decided to choose the highest probability (usually greater than one) and the corresponding class name was the result of the group classifier.  

The problem with the probabilities greater than one turned out to be about the independence assumption of the variables which is wrong for Bayesian Networks. Considering the conditional independence assumption helped us successfully resolve our problem. Now our application gives outputs which are probabilities from 0 to 1 and we also gain satisfactory efficiency of our system (the efficiency of prediction of our group classifier).  

Now we calculate $P(G_j \mid A_1, \ldots, A_{i-1})$ every time we observe a new attribute $A_i$ and after it we use the updated value $P(G_j \mid A_1, \ldots, A_{i-1})$ for our further calculations. We calculate the required probabilities in the following way:  

- For example when we observe attribute $A_1$, we update $P(G_j)$ and replace it by  
  $$P(G_j \mid A_1) = \frac{P(A_1 \mid G_j) \cdot P(G_j)}{P(A_1)}$$  
- For example when we observe attribute $A_2$, we want to calculate $P(G_j \mid A_1, A_2)$, but it is enough to update $P(G_j \mid A_1)$:  
  $$P(G_j \mid A_1, A_2) = \frac{P(G_j \mid A_1) \cdot P(A_2 \mid G_j)}{P(A_1)}$$  

We are still thinking about how to implement the animal classifier. We are considering the same modeling paradigm like for the group classifier and the Decision Tree modeling paradigm. We think that both of the solutions fit very good our application. We are receiving very good efficiency of group prediction in our application, so we think that we will rather apply the Bayesian Network paradigm for the second classifier.  

Our first version of our program is working good now. It is in text mode without Graphical User Interface (which we have already designed), but we are going to implement it later in the form of an Java applet.  

I think that the project is very valuable for us. After acquiring some theoretical information during the last several lectures we have a chance to implement some of the modeling paradigms and see how they work. The project teaches us also how to work in a group and how to divide the work between members of the group. I think that the practice gain during that project will help us with better understanding the modeling paradigms which we have. Unfortunately I need to admit that I had not gotten a lot of practice with any of the modeling paradigms before the Expert Systems course, so it is a very big and valuable experience for me.